Priest River

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1968 ANNUAL REPORT

Priest River Experimental Forest
Priest River, Idaho

by

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Distribution:
Ogden
Wollner
Copeland
RWU 1201
RWU 1601
RWU 2303
NFFL
Kaniksu SO
Falls RS
PREF

Intermountain Forest and Range Experiment Station
Ogden, Utah

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INTRODUCTION

The year 1968, which was the 57th consecutive year of operation for the Priest River Experimental Forest, proved to be one with diverse activities. Station facilities were kept busy from June 1 through October 18. Fire-weather extremes such as those that hampered progress the previous year were nonexistent due to above-normal precipitation which commenced in mid-August and continued until seasonal operations were completed.

The year's activities are summarized in the following pages.

RESEARCH ACTIVITIES

Timber Management Research

Supplementary Weeding of Transect

Transect weeding to remove deciduous trees (not in 1966 contract) was accomplished with use of the Hypo-Hatchet injector, and Silvisar-510 Tree Killer. Check on effectiveness will be made in the 1969 summer season.

Habitat-Type Mapping

The cooperative habitat-type mapping investigation conducted by Dr. Daubenmire, Washington State University, was completed July 24, 1968. Objectives of this investigation included (1) clarification of delineation problems involving actual field mapping of habitat types, and (2) provision of a habitat-type map of the Benton Creek drainage.

Genetics Research

Vigor-Quality Outplantings

Continued maintenance of these plots by R. J. Steinhoff was carried on periodically throughout the field season. Work performed included checks on survival, height growth, and blister rust incidence, and replanting of seedlings.

Plot 162

Regular periodic observations were made during the summer season by R. J. Steinhoff.

Watershed Management Research

Benton Creek Model Watershed

During the last year, RWU 1601 has modified, designed, improved, and expanded instrumentation installations in the Benton Creek watershed. At the present time there is a total of 15 stations and 58 instruments, which are being serviced weekly, providing data which will be useful in flood and erosion control. Station identification and instrumentation are presently listed as follows:

Station #51
- Snowmelt lysimeter
- Precipitation gage
- Hygrothermograph
- Totalizing anemometer

Station #48
- Snowmelt lysimeter
- Hygrothermograph

Station #46
- Snowmelt lysimeter
- Precipitation gage
- Hygrothermograph
- Totalizing anemometer

Station #45
- Snowmelt lysimeter
- Precipitation gage
- Hygrothermograph
- Totalizing anemometer

Station #42
- Snowmelt lysimeter
- Precipitation gage
- Hygrothermograph
- Totalizing anemometer

Station #39(OPEN)
- Snowmelt lysimeter
- Precipitation gage
- Hygrothermograph
- Totalizing anemometer
- Hourly wind recorder
- Solar radiometer
- Tree weighing gages (2)

Station #39(TIMBER)
- Snowmelt lysimeter
- Precipitation gage
- Hygrothermograph
- Totalizing anemometer
- Hourly wind recorder

Station #29
- Snowmelt lysimeter
- Precipitation gage
- Hygrothermograph
- Totalizing anemometer
- Solar radiometer

Station #35
- Snowmelt lysimeter
- Precipitation gage
- Hygrothermograph
- Totalizing anemometer
- Solar radiometer

Station #6
- Water level recorder

Station #5
- Water level recorder

Station #4
- Water level recorder

Station--Main Benton Creek
- Water level recorder
- Precipitation gage

Headquarters--control
- Precipitation gage
- Hygrothermograph
- Solar radiometer
- Totalizing anemometer
- Hourly wind recorder
- Tree weighing gages (2)
- Microbarograph

TOTAL = 58 instruments

- 10 snowmelt lysimeters
- 11 precipitation gages
- 11 hygrothermographs
- 10 totalizing anemometers
- 3 hourly wind recorders
- 4 solar radiometers
- 4 tree weighing gages
- 4 water level recorders
- 1 microbarograph

Cooperative Study with WSU on Snow Interception

RWU 1601 and Don Satterlund of Washington State University initiated this study in 1965 to gain information on snow interception and evaporation in the coniferous species. Measurements continue to be taken.

Forest Disease Research

Pole Blight

A 7-man crew involved in final examinations of trees on the "pole blight induction" plots utilized the marshall-bunkhouse facilities through the field season of 1968. A cook was hired for the summer, serving three meals per day. The crew put in a total of approximately 4,000 manhours from June 1 through September 6. A resumé of the study is as follows:

In 1955, two plots approximately 30x50 feet were located near the administrative site on the PREF to determine whether a superimposed moisture stress would induce symptoms of the pole blight disease in 90±-year-old western white pine. All trees except white pine were removed from the plots. A wooden shelter was built around the trees on one plot to exclude precipitation (year around) and the plot was trenched around the shelter. The other plot was untreated except by removal of other tree species.

In 1956, two more plots were located near the above two; however, only dead trees at that time were removed on both. Both plots were covered with plastic vinyl sheeting laid on the ground and around the trees, again to exclude moisture. Both were trenched around the plastic shelters. One plot retained its cover on a year-around basis, but the cover was removed from the other plot for the period from early October through late March or early April, after snow had melted. It was replaced during the April to October period.

All plots were maintained on the above basis until the spring of 1968. Soil moisture measurements were made during this interval each year in April and October; sampling was done to a depth of 6 feet on all plots. In late April 1968, the permanent plastic and wooden shelters were removed prior to complete dismantling.

Through a cooperative agreement established by RWU 2303 with both the University of Idaho (Dr. H. Loewenstein, principal cooperator) and the Forest Research Laboratory at Victoria, British Columbia (Dr. R. G. McMinn, principal cooperator), complete dismantling of all four plots

started in June 1968. By early July, all trees had been felled, cut into 4-foot bolts, peeled, and samples relative to needle length and weight, growth segment lengths, etc. One dominant or codominant tree on each plot was weighed in total, eventually including its roots.

By July 8, washing of the root systems of the trees on these plots was in full swing. Catchment basins and a settling pond had previously been constructed. Two pumps, operating from Benton Creek or the catchment basins, provided sufficient water to expose the lateral and vertical root systems. Operating about 10 hours a day, 6 days a week (and sometimes 7 days) with minor breakdowns of several days' duration, washing was completed by the end of August. Measurements (e.g., total length and weights by diameter classes) of the lateral and vertical roots on most trees were completed by September 6.

Data now being analyzed from these plots include physical analyses of the soils, chemical analyses of the soils and foliage, branch, stem and root components of selected trees, annual ring-width measurements in vertical sequence from 0.5 meters above ground to tree-top at 3-meter intervals on all trees, and root-shoot ratio comparisons. Wondering why the completely sheltered trees had lived through the period of moisture stress, we were particularly interested in their vertical systems. Vertical roots of trees, except cedars, had penetrated on all plots to sand horizons through which water moved laterally under the plot at least part of the year. It seems most probable that these roots had penetrated to these horizons prior to shelter establishment. Although the trees under the permanent (and also semi-permanent) shelters declined in terminal and radial growth in contrast to those on the control plot, they apparently obtained sufficient water (and presumably minerals) from underground water sources to sustain life. In fact for white pine, the trees had accomplished sufficient vertical projection to satisfy their needs perhaps by the early 1940's, since they had survived pole blight which caused some mortality in the immediate vicinity.

Dwarfmistletoe

Regular maintenance duties at the field plot which was established in 1961 at the old nursery site for the purpose of studying host specificity and age susceptibility of dwarfmistletoe in different tree species were continued by Ed Wicker. The seedling plots which were installed for investigating certain aspects of the relationships of Tuberculina maxima to white pine blister rust cankers were also maintained. During the winter of 1968, 1500 dwarfmistletoe infections, collected from complete eradication study plots on the Colville National Forest were prepared for microscopic examination by the superintendent of PREF and infection age was determined. These data will be used to evaluate the impact of latent and missed infections on future efforts to silviculturally control dwarfmistletoe of western larch, Douglas-fir, and lodgepole pine.

Collection and Study of Fungi

Dr. Alexander H. Smith, University of Michigan mycologist, assisted by his wife, Dr. Helen Smith, and Dr. Ronald Peterson, University of Tennessee, utilized the PREF headquarters station from September through October while collecting and conducting intensive studies of the mushroom fungi in northern Idaho.

Forest Insect Research

Larch Casebearer

This study which was initiated in 1967 to determine the effects of casebearer defoliation on western larch was maintained through the field season by Robert Benton and his assistants.

Forest Influences

Control Weather Station

Weather data at this station continued to be taken through this 57th year of operation (table 1). Regular weekly and monthly reports again were provided for publication in the Priest River Times newspaper. Other requests were received throughout the year from varied agencies and private individuals.

In comparison with other years, the September 1967-August 1968 cumulative precipitation followed a quite average trend (fig. 1).

Fire Weather Station

In accordance with the National Fire Danger Rating System, fire weather records were maintained, and regular 10-day reports were mailed to the fire dispatcher at the Supervisor's Office in Sandpoint, Idaho. The regular season during which data are recorded includes May 1 through October 31.

Precipitation

Daily records of precipitation are taken at the control weather station and Benton Dam. A storage gage at Benton Spring continues to provide monthly precipitation data. Comparison of monthly measurements at the three sites is given in table 2.

Snow Survey

Under cooperative agreement with the Soil Conservation Service, Benton Spring and Benton Meadow snow courses were measured monthly from January through May 1968. Results are presented in table 3.

Table 1.--Control-station monthly precipitation and temperature, 1968. Figures in parentheses are 50-year (1912-1961) averages.

Month	Precipitation		Temperature	
			Av. max.	Av. min.
	-- inches --		---- degrees F. ----	
January	4.88	(4.02)	30.8 (30.3)	19.8 (16.6)
February	4.24	(3.09)	41.6 (36.9)	20.7 (18.3)
March	2.41	(2.65)	48.6 (45.3)	27.1 (23.5)
April	1.07	(2.04)	53.3 (57.6)	28.7 (29.6)
May	1.68	(2.18)	65.4 (66.7)	36.2 (36.6)
June	2.17	(2.27)	71.0 (75.3)	42.9 (42.5)
July	0.84	(0.89)	84.5 (83.1)	46.8 (45.5)
August	3.27	(0.97)	75.2 (80.2)	46.1 (43.4)
September	2.30	(1.67)	67.6 (70.9)	41.3 (37.8)
October	5.09	(2.96)	30.3 (56.6)	32.3 (32.1)
November	4.49	(3.76)	38.0 (39.6)	27.8 (26.7)
December 1/	5.84	(4.37)	28.4 (32.5)	19.3 (21.1)
Annual	38.28	(30.87)	55.0 (56.1)	32.4 (31.0)

1/ December--an all-time low temperature of -36° F. broke the former 1927 record of -28° F.

Fig. 1.--CUMULATIVE PRECIPITATION, SEPTEMBER THROUGH AUGUST, PRIEST RIVER EXPERIMENTAL FOREST

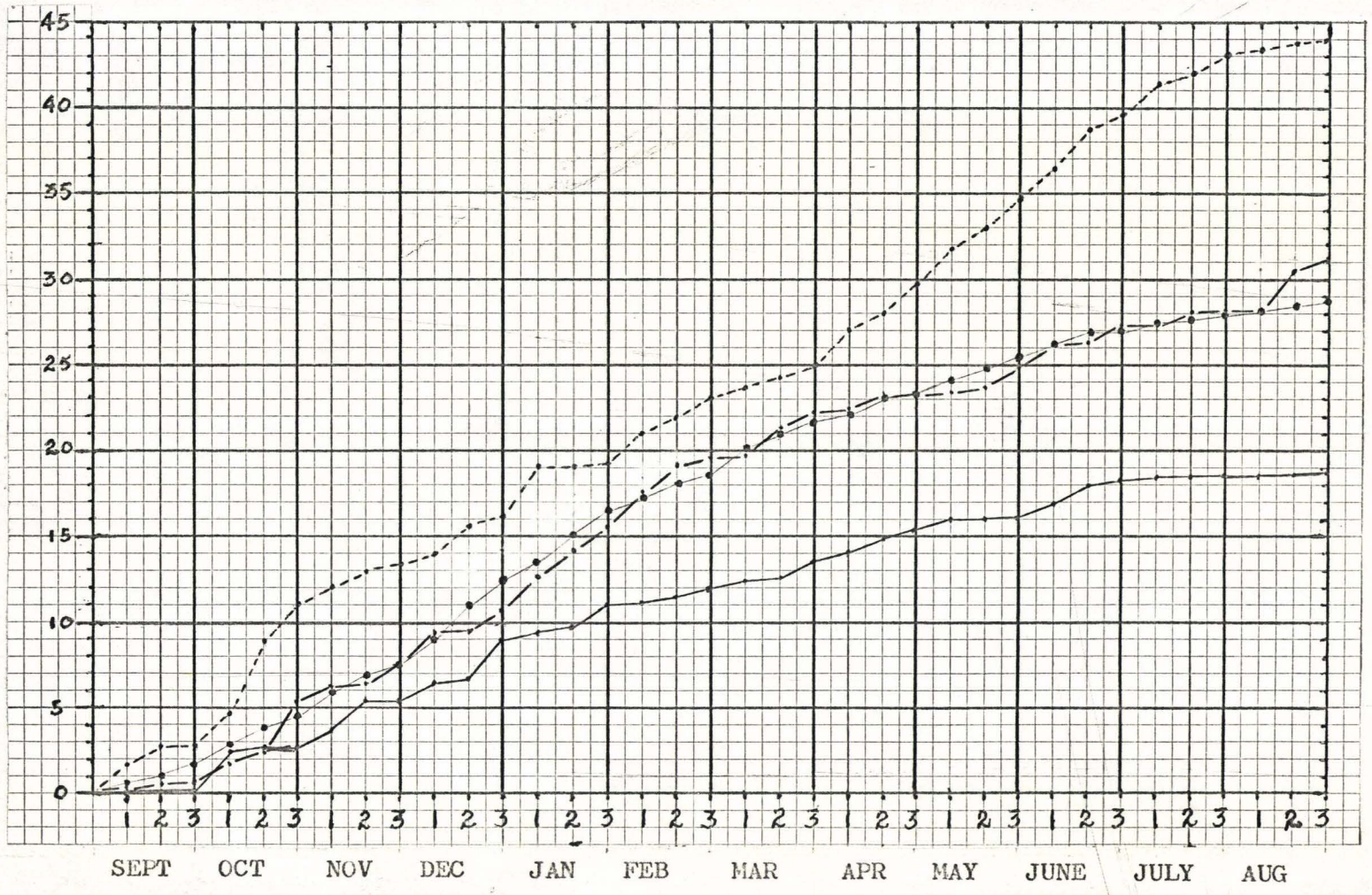

Table 2.--Precipitation at 3 stations on Benton Creek. Figures in parentheses are 9-year (1960-1968) averages.

Month	Control Station (elev. 2344')	Benton Dam (elev. 2640')	Benton Spring (elev. 4700')
	inches		
January	4.88 (4.10)	4.90 (4.97)	4.60 (3.77)
February	4.24 (2.71)	4.24 (2.86)	4.90 (3.14)
March	2.41 (3.22)	2.63 (3.44)	2.90 (3.83)
April	1.07 (1.90)	1.28 (2.10)	1.30 (2.58)
May	1.68 (2.55)	1.66 (2.63)	3.10 (3.38)
June	2.17 (2.03)	1.96 (2.18)	2.80 (2.55)
July	0.84 (0.78)	0.99 (0.80)	1.10 (0.96)
August	3.27 (1.53)	3.68 (1.81)	4.30 (1.91)
September	2.39 (1.36)	2.14 (1.30)	2.80 (1.34)
October	5.09 (2.76)	5.14 (2.61)	5.50 (2.77)
November	4.49 (5.23)	4.53 (5.40)	4.40 (5.37)
December	5.84 (4.55)	6.12 (5.23)	5.90 (5.38)
Annual	38.37(32.72)	39.27(35.33)	43.60(36.98)

Table 3.--Snow depth and water content at Benton Meadow and Benton Spring snow courses, 1968. Figures in parentheses are 27-year (1937-1961) averages.

Date	Benton Meadow (elev. 2344')		Benton Spring (elev. 4775')	
	Snow depth	Water content	Snow depth	Water content
	inches			
January 1	12.3 (12.0)	3.0(2.7)	22.7 (30.9)	6.2 (8.4)
February 1	28.5 (19.4)	5.6 (4.8)	38.7 (46.8)	10.7 (13.7)
March 1	15.4 (19.3)	4.6 (6.0)	36.3 (55.3)	13.0 (18.4)
April 1	7.0 (6.2)	2.6 (2.3)	35.4 (55.6)	13.3 (20.4)
May 1	0.0 (0.0)	0.0 (0.0)	26.8 (34.0)	11.9 (14.8)

Other Climatic Stations

Once again, 1968 proved to be one of further progress in installing and improving facilities needed for watershed management research. These developments are described in that section.

ADMINISTRATIVE ACTIVITIES

Fire Protection

The fire plan was reviewed and found satisfactory. It contains the applicable portion of the Falls District plan, outlines the Experimental Forest responsibilites, and provides an action plan for the headquarters area.

Forest Roads

Preliminary layout work was completed on the following roads proposed for construction using appropriate funds: M-3, .70 mi.; M-4, .39 mi.; L-1, .21 mi.; L-2, .39 mi.; extension and L-3, .25 mi.; extension. Road K8 layout not complete at the present time.

Direct Seeding, PREF

Approximately 10 acres of Unit A of the Upper Benton Creek sale area were direct seeded on October 20-22, 1968. Seed was dispersed at an approximate rate of 20,000 viable seeds per acre. Since freshly collected seed was used, we had to "sow blind" without the benefit of germination tests. Germination percentages of 50%, 60%, and 70% were assumed for grand fir, Douglas-fir, and spruce respectively. Grand fir and Douglas-fir seed was coated with the standard mixture of endrin-arasan-aluminum powder in latex. Spruce was not coated. Treated seed was mixed in the following proportions: 1/2 grand fir, 3/8 Douglas-fir, and 1/8 spruce on an assumed viable seed basis. Seed was mixed with dry, screened sawdust as a filler and spread in 18-foot swaths with cyclone seeders.

Eight pairs of protected vs. open-sown seed plots were established at random over the area. Hardware-cloth "enclosures" were constructed and installed and sown with 10 grand fir, 10 Douglas-fir, and 10 spruce seeds. A similar "open" plot in the vicinity was sown with the same number of seeds to check on rodent predation. Germination and mortality will be closely observed on these plots during the spring and summer of 1969.

Timber Management

Analog cams were placed in varied locations in blocks A and B of the upper Benton Creek sale, clearcut area, and collected after burning, for the purpose of obtaining quantitative information of intensity of burn.

Timber Sales

Lower Canyon Creek (5/25/65-Ron McDonald). This timber sale was described in the 1964-1965 annual report. An extension was granted to 12/31/68. Sale was finally completed under a third-party agreement.

Inspection of road construction plus reconstruction was made and they were found to be satisfactory.

Lower Benton Creek (11/28/66-Hedlund Lumber Co.). Description of this sale was made in the 1966 and 1967 annual reports. Sale was completed 1968. All new road construction and reconstruction were completed in compliance with contract.

Upper Benton Creek (7/1/68-Hedlund Lumber Co.). This sale was conducted for study installations of the watershed research project. It was a lump-sum sale consisting of two strips about 50x600' and 200x700' which were clearcut. The study objective will be to evaluate seasonal changes in snow water equivalent on clearcut openings as affected by distance from adjoining timber and by major slope exposure. Sale was completed in accordance to contract, August 1, 1968.

Improvements and Maintenance

On May 14, 1968, a meeting was held at PREF headquarters station for the purpose of scheduling regular monthly safety inspections. Responsibility for planning and conducting is to be alternated between the Superintendent of PREF and personnel representing Project 1601 who are employed at the station. A standard form was set up for notation where corrective action is needed for improvement.

A habitat-type map of the Experimental Forest was prepared by Dr. R. Daubenmire, WSU, as part of a cooperative study with the Intermountain Station. The primary objective of this project was to test the feasibility of mapping forest land on the habitat type basis, using PREF as a test area. Another objective was to compile a check list of the vascular flora of the same area.

Culinary water samples were taken the first of January and June, and submitted for analysis by the Idaho State Health Department. Results: no contamination.

The entire sewer system operated satisfactorily throughout the year. In the future regular periodic checks will be made for the purpose of removing vegetation growth near the banks of the lagoon and along the discharge line.

Maintenance checks at the Fire Behavior Experimental Area were made during the year. Fence repair was necessary, due to breakage from snow load and deer crossings.

Regular maintenance of the headquarters was accomplished, including landscaping, irrigation, pruning, mowing lawns, and weed control. Early June application of calcium chloride to roads in the headquarters area again effectively reduced dust problems there.

A brief outline of building maintenance performed in 1968 follows:

(a) Office: Repair and minor modification in the plumbing system was necessary.

(b) Bunkhouse-messhall: A 100-gallon propane tank was installed. The gas grill which was obtained as a surplus item from the Falls Ranger Station in 1967 was utilized throughout the summer months. Foundation repair was required due to erosive action. Minor plumbing repair was needed also.

(c) Cottage #1--Floors were refinished in the entire downstairs area. New floor cover was installed in the upstairs bathroom. Two applications of marine paint were made in the basement shower. All woodwork trim in the basement and upstairs area was varnished, including stairways. Storm windows were installed, and minor roof repair was made.

(d) Cottage #2--Varnish was applied to all wood trim in the living quarters.

(e) Cottage #4--Paint was applied to interior of guest bedroom. Minor plumbing repair.

(f) Removal of the old existing wood posts and barbed wire fencing along 1.2 miles of Experimental Forest main road frontage, and replacement of steel posts and 3-strand barbed wire was accomplished by hot-shot crews furnished by the Priest Lake Ranger District during the latter part of August.

(g) Shop--A new foundation and floor slab were installed in the west section (old blacksmith shop) of the building.

(h) The clotheslines for #2 and #3 cottages were replaced.

(i) Regular monthly checks were made on all installations. With the occurrence of sudden change in temperature, added inspections were made.

(j) A section of the overhead power line that operated the automatic pump control at the water system reservoir was replaced with an underground cable. Wind falls from the timber adjacent to the 658 feet of line between the lodge and reservoir have been a constant source of trouble.

(k) One hundred eighty cubic yards of gravel was put behind the back entry of the lodge to improve drainage, enlarge parking space, and provide an area for recreational installations.

Personnel

Local Employees:

Position	Dates	Names
Superintendent	1/30/65-present	Cal Carpenter
Forestry Research Technician	8/19/64-present	Bud Jeffers
Forestry Aid	Intermittent	William Manly
Maintenance Man	Intermittent	Pat Murray
Maintenance Woman	Intermittent	Jane Knoke

Inspections

April 29, 1968	Inspection of fire weather station by Mike Hardy, William Fischer, and Charles George of the Northern Forest Fir Lab, Missoula, Montana.
June 26, 1968	Road and sale inspection of the Lower Benton Creek Timber Sale by Ben Plowgian, Glenn Deitschman, and Cal Carpenter.
July 9, 1968	Road and sale inspection of Lower Benton Timber Sale by Glenn Deitschman, Ted Kardos (Falls District), and Cal Carpenter.

Monthly safety inspections, with the aid of Moscow Lab personnel, were made throughout the field season.

Official Visitors

The Experimental Forest was utilized by numerous groups and individuals during the year 1968. Following is a chronological listing of visitors who used the forest for research or educational purposes. (Intermountain Station personnel conducting research are not included.)

Dates	Visitors	Purpose
Jan, Feb	Dr. Don Satterlund, Boyd Hill (WSU)	Project inspections and advisory consultation in connection with snow interception studies.
Feb. 22, 1968	John E. Martin (Adm. Assistant to U.S. Sen. L. B. Jordan)	Show-me trip and general familiarization of the history and main functions of the Experimental Forest

Dates	Visitors	Purpose
Feb, Mar	Dr. George Belt (Univ. of Idaho)	Snow interception and evaporation studies.
April 8,9,10	Russel Bishop William Warren Chris Warren (all Coolin, Ida.) Herb Reeling (Bozen, Mont.) Dan Satterlund (WSU) Robert Mathison Karl Rainsel Don Ruark (all Grangeville, Ida.) Charles Harnish Ron Johnson (SO, Sandpoint, Ida.)	Observations of the latest techniques in recording climatic conditions and spring snowmelt, also latest development of instrumentation.
May 13	18-member adult science education group, Sandpoint, Idaho	General trou of the headquarters station and active projects.
May 24,25	Dr. R. Daubenmire and 22 students in field ecology class (WSU)	Field observation of ecological communities and research activities at PREF.
June,July (intermittent)	Robert McMinn, Al Funk (FSL, Victoria, B.C.)	Project inspections and advisory consultation, in connection with pole blight studies.
June	Elmer Canfield (Univ. of Idaho)	Study of cull occurrence in redcedar as related to ecological factors.
June,July, Aug (Intermittant)	Dr. Howard Lowenstein (Univ. of Idaho)	Inspection and consultation in connection with pole blight project.
June 13	Bonner County Commissioners and Falls District personnel	General tour of headquarters station and active projects at PREF.
July 1	Marvin Grimmer (FSL, Victoria, B.C.)	Active participation and part-time supervisory capacity, pole blight study.

Dates	Visitors	Purpose
July 1	Dr. R. Daubenmire (WSU)	Habitat type mapping, experimental forest.
July 12	Univ. of Montana 12-member mycology class headed by Orson Miller	Tour of Experimental Forest and collect fungi in lower Canyon Creek area.
July 18	Frank Pitkin (Univ. of Idaho)	Pole blight project inspec tion.
July 19	Dr. R. Daubenmire, 15-member group	Ecology demonstration tour.
July 26	Sam Evans Lloyd Swanger Ted Kardos	Discussions on experimental forest management objectives and needs.
Sept. 7- Oct. 17	Drs. A. and H. Smith (Univ. of Michigan)	Collection and study of higher fungi.
Sept. 13- Oct. 20	Dr. Ronald Peterson (Univ. of Tenn.)	Same as above
Sept. 17- Oct. 7	Nancy Smith (Ann Arbor, Mich.)	Collection of higher fungi and thesis work.
Sept. 29- Oct. 6	Walter Litton (Rochester, N.Y.)	Collection of higher fungi.
Oct. 31	70-member pathologist tour [representatives from US and Canada)	Observation of studies being conducted at PREF.
Aug. 26	N. R. Josephson & wife Dave Harrick (Washington, D.C.) Joe Pechanec (Ogden) Blair Hutchison (Ogden) Bob Benson (Missoula)	Visit during GFI of forest economics research.

Cooperation

As in the past, the Kaniksu National Forest provided technical advice and assistance on engineering problems associated with the general operation of the station. The Falls Ranger Station administered timber sales. The regular annual meeting with Falls District personnel was held in Moscow, at Forestry Sciences Lab, February 15, 1968, with general discussion of timber sales, roads, K-V funds, stage 2 exams, and other miscellaneous items. A thorough review of the memorandum of understanding was accomplished; no need for changes was seen at the present time.